GENERAL ORDER 143-A
(Superseding General Order 143 adopted June 27, 1978)

PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

SAFETY RULES AND REGULATIONS GOVERNING LIGHT-RAIL TRANSIT

Adopted May 8, 1991. Effective June 7, 1991
Decision 91-05-015 in I.89-07-003.
Amended April 6, 1994; Effective May 1, 1994
Resolution ST-11

TABLE OF CONTENTS

Title	*Page No.*
1. GENERAL PROVISIONS	2
2. DEFINITIONS	3
3. EQUIPMENT ON LIGHT-RAIL VEHICLES	5
4. BRAKES ON LIGHT-RAIL VEHICLES	6
5. LIGHTING ON LIGHT-RAIL VEHICLES	9
6. CONSTRUCTION REQUIREMENTS FOR LIGHT-RAIL VEHICLES	10
7. OPERATING SPEED AND TRAIN PROTECTION REQUIREMENTS	11
8. SPECIAL PROVISIONS FOR HISTORICAL STREETCARS	13
9. RIGHT-OF-WAY STANDARDS	15
10. TRACTION POWER REQUIREMENTS	19
11. FIRE PROTECTION REQUIREMENTS	21
12. REQUIREMENTS OF SAFETY SENSITIVE EMPLOYEES	22
13. OPERATING RULES	23
14. INSPECTIONS, TESTS, AND MAINTENANCE	24
15. ACCIDENT REPORTING REQUIREMENTS	25
16. MISCELLANEOUS REPORTING REQUIREMENTS	26
TABLE 1. MAXIMUM PERMITTED SPEEDS FOR LIGHT-RAIL TRANSIT SYSTEMS	27

1. GENERAL PROVISIONS

1.01—SHORT TITLE. These rules and regulations shall be known as "General Order No. 143-A."

1.02—AUTHORITY. These rules and regulations are authorized by and implement the provisions of Sections 778, 29047, 30646, 99152, and 100168 of the Public Utilities Code.

1.03—PURPOSE. The purpose of these rules and regulations is to establish safety requirements governing the design, construction, operation, and maintenance of light-rail transit systems in the State of California. The safety of patrons, employees, and the public is of primary importance in the application of these regulations.

1.04—APPLICABILITY. These rules and regulations are applicable to light-rail public transit guideways planned, acquired, or constructed on or after January 1, 1979, and to all private light-rail transit systems in accordance with Sections 778 and 99152 of the California Public Utilities Code. Light rail transit carriers not subject to the Commission's jurisdiction are encouraged to follow these rules and regulations.

1.05—NOT RETROACTIVE. Unless otherwise specified, these rules and regulations shall not require reconstruction, additions, or changes to existing systems, facilities, and light-rail vehicles in service or advertised for construction prior to the effective date hereof. This section does not apply to maintenance of equipment and facilities.

1.06—COMMISSION MAY ORDER ADDITIONAL RULES. The Commission may make such further additional rules or changes as necessary for the purpose of safety to employees and the general public.

1.07—EXEMPTIONS OR MODIFICATIONS. Requests for exemptions or modifications from these rules and regulations shall contain a full statement of the reasons justifying the request and demonstrating that safety is not reduced thereby. Any exemption or modification so granted shall be limited to the particular case covered by the request.

1.08—LRV EQUIPMENT AND CONDITION. Every LRV, as defined in Section 2.09 of these rules and regulations, used in revenue service shall be equipped as required by this General Order. All such LRV equipment shall be maintained in safe proper working condition as required by the carriers' approved operating rules and procedures.

* * *

2. DEFINITIONS

2.01—AUTOMATIC BLOCK SIGNAL SYSTEM (ABS). A series of consecutive blocks of track over which entry to each block is governed by block signals, cab signals, or both, which are actuated by the presence of an LRV or train or by certain other conditions affecting the use of the block.

2.02—AUTOMATIC TRAIN PROTECTION (ATP). A system for assuring safe train movement by a combination of train detection, separation of trains running on the same track or over interlocked routes, overspeed prevention, and route interlocking.

2.03—AUTOMATIC TRAIN STOP (ATS). A device so designed and installed that, should the operator permit a train to pass a signal indicating "stop", there will be an automatic application of the brakes which cannot be released until the train is brought to a stop.

2.04—CAB SIGNAL SYSTEM. A signal system whereby block condition and the prevailing civil speed commands are transmitted and displayed directly within the train cab. The cab signal system may be operated in conjunction with a system of fixed way-side signals or separately.

2.05—CARRIER. Unless the context indicates otherwise, "carrier" means a LRT system.

2.06—COMMISSION. The Public Utilities Commission of the State of California.

2.07—FAIL-SAFE. A characteristic of a system which ensures that any malfunction affecting safety will cause the system to revert to a state that is known to be safe.

2.08—LIGHT-RAIL TRANSIT (LRT). A mode of urban transportation employing light-rail vehicles capable of operating on all the alignment classifications described in this General Order.

2.09—LIGHT-RAIL VEHICLES (LRV). A wheeled vehicle, for the conveyance of passengers, which is electrically propelled and operates upon a track or rails on the alignment classifications described in this General Order.

2.10—OPERATOR. The LRT employee on board the train having direct and immediate control over the movement of the train.

2.11—PUBLIC TRANSIT GUIDEWAY. A system of public transportation utilizing passenger vehicles that are physically restricted from discretionary movement in a lateral direction.

2.12—SEPARATE RIGHT-OF-WAY. A corridor within which LRVs operate apart from parallel motor vehicle traffic but may contain locations of mixed traffic crossings.

2.13—STREETCAR. An LRV operated in mixed street traffic.

2.14—TRAIN. A single LRV or multiple LRVs combined to operate as one unit.

* * *

3. EQUIPMENT ON LIGHT-RAIL VEHICLES

3.01—SPEEDOMETERS. Every LRV shall be equipped with a speedometer installed in such a position so as to be easily seen by the operator. The speedometer shall indicate the speed in miles per hour with an accuracy of five (5) percent at all times.

3.02—WINDSHIELD WIPERS AND DEFROSTERS. Every LRV when operating under conditions which are likely to cause ice, frost, fog, or moisture to collect on the windshield, shall be equipped with window wipers and an electric or mechanically operated device designed to prevent or remove such collection of ice, frost, fog, or moisture.

3.03—REAR VISION MIRRORS. Every LRV operating cab shall be equipped with two (2) rear vision mirrors, one on each side of the vehicle, located so as to allow the operator a view of the rear along both sides of the train for the full length of the train on tangent track.

3.04—AUDIBLE WARNING DEVICES. Every LRV shall be equipped with a bell or horn capable of producing a clearly audible warning measuring at least 75 dBA at a distance of 100 feet from the vehicle. In addition, every LRV operating on separate right-of-way over motor vehicle grade crossings shall be equipped with a horn or whistle capable of producing a clearly audible warning measuring at least 85 dBA at a distance of 100 feet from the LRV.

3.05—GRAB HANDLES. Every LRV shall be equipped with grab handles, stanchions, or bars for the use of standing passengers and for the use of persons boarding or leaving such vehicles.

3.06—SAFETY BARS. Every LRV shall be equipped with a bar made of wood, fiberglass, or metal installed full width in front of the leading wheels of an LRV, or a fender or lifeguard to provide protection against foreign objects being caught under the car body when the LRV or the train is in motion.

3.07—BLOCKED DOOR OPERATION. The passenger side doors of every LRV shall be designed to minimize the possibility of persons or objects being caught in them while closing.

3.08—WARNING DEVICES FOR STOPPED LIGHT-RAIL VEHICLES. Except when LRV operation is completely on exclusive right-of-way, emergency warning devices such as bidirectional emergency reflective triangles, fusees, red flags and/or flashlights shall be maintained in a suitable container or compartment on every LRV.

* * *

4. BRAKES ON LIGHT-RAIL VEHICLES

4.01—DEFINITIONS USED IN THIS PART. The following definitions apply to words and phrases used in this part:

a. Average Deceleration Rate.
The rate obtained by dividing the speed at which the brakes are initiated (brake entry speed) by the elapsed time until no motion is detected. The average deceleration rate does not include operator reaction time.

b. Jerk.
The average rate of change of acceleration or deceleration.

4.02—BRAKING SYSTEMS. Every LRV shall have a service and an emergency braking system. The service braking system shall consist of a combination of dynamic and friction brakes. The emergency braking system shall consist of a combination of the service braking system and independent magnetic track brakes.

4.03—BRAKE RATES. Every LRV shall meet or exceed the average deceleration rates shown in Table 4.1 below when tested at the designated brake entry speeds. Tests run at speeds between those designated in the table shall meet the average deceleration rates listed for the next higher brake entry speed.

TABLE 4.1

BRAKE(1) ENTRY SPEED (MPH)	AVERAGE DECELERATION RATE (MPHPS) SERVICE BRAKING SYSTEM	DYNAMIC (2) BRAKES CUTOUT	EMERGENCY BRAKING SYSTEM
55 or more	2.7	1.9	4.5
45	2.6	2.0	5.2
35	2.5	2.0	4.5
25	2.3	2.1	4.5
20 or less	2.2	2.2	3.5

Notes.

(1) All tests shall be conducted on dry, level, tangent track for all conditions of loading up to the maximum operating loads as established by the Transit Authority.

(2) The average deceleration rates, when dynamic brakes are cut out, shall be met by the friction brakes acting alone or in combination with the track brakes.

4.04—JERK LIMIT. The service braking system shall be jerk limited to minimize injuries to the vehicle occupants. The emergency braking system shall not be jerk limited.

4.05—SPIN/SLIDE PROTECTION. LRVs equipped with spin/slide protection shall be designed for fail-safe operation so that a system failure will cause the spin/slide protection to be by-passed.

4.06—DYNAMIC BRAKE FAILURE INDICATION. Detectable failures of the dynamic brakes shall be annunciated by visual and audible warning devices.

4.07—DYNAMIC BRAKE FAILURE PROCEDURE. If a failure of the dynamic braking system is annunciated, the LRV shall be brought to a stop at the earliest possible moment. If determined safe to proceed, the train may then remain in service, at a reduced speed not exceeding 25 mph, until it reaches the end of the line or a repair facility, where the affected car(s) must be repaired or taken out of service.

4.08—PARKING BRAKES. Every LRV shall be equipped with parking brakes which can be applied without assistance of any electric, hydraulic, pneumatic, or other form of non-mechanical energy. Such brakes shall be adequate to hold the LRV stationary under all conditions of loading of any grade on which it is operated.

4.09—OUT-OF-SERVICE INTERCONNECT. The parking brakes shall be designed and constructed so that when the LRV is placed in any out-of-service or lay-up mode, the brakes will be automatically applied to hold the LRV or train stationary under all conditions of loading on any grade on which it may be operated.

4.10—DOOR INTERLOCK. The passenger side door shall be interlocked with the braking and propulsion control systems in such a manner that a stopped LRV cannot start and a LRV in motion will automatically brake if the doors are not closed.

4.11—WHEELCHAIR LIFT. LRVs equipped with a wheelchair lift shall be designed and constructed so that the LRV can be moved only when the lift is completely stowed and the lift can be deployed only when the LRV is stopped.

4.12—DEADMAN CONTROL. Every LRV shall be equipped with a safety device that requires the operator's continuous pressure or activity to remain activated. The safety device shall be interconnected with the propulsion and service braking system in such a manner that should the device fail to detect an appropriate level of activity or pressure exerted by the operator, propulsion power will be interrupted, brakes will be automatically applied in a non-retrievable manner, and the train will be brought to a stop.

* * *

5. LIGHTING ON LIGHT-RAIL VEHICLES

5.01—HEADLIGHTS. Every LRV which operates on a separate right-of-way shall be equipped with a headlight or headlights that are capable of revealing a person or motor vehicle in clear weather at a distance of 600 feet. Every LRV which operates on a public street or road shall be equipped with a headlight or headlights that are capable of revealing a person or motor vehicle in clear weather at a distance of 350 feet and shall be designed and adjusted so as not to interfere with the vision of drivers of motor vehicles. Headlights may be dimmed or extinguished under conditions where their use could pose a safety hazard to motorists in adjacent traffic lanes.

5.02—TAILLIGHTS AND STOPLIGHTS. Every LRV shall be equipped with two (2) red taillights at the end of the LRV opposite from the direction of travel and shall emit a red light plainly visible in clear weather from a distance of not less than 500 feet to the rear of the LRV or train. In addition, at least two (2) red stoplights shall be mounted on the end of the LRV with the taillights. Stoplights shall be capable of producing approximately 150 percent of the intensity of the taillights and shall be illuminated whenever any brake except the parking brake is applied.

5.03—DOORWAY LIGHTS. Every LRV shall be equipped with lights to illuminate the doorway and adjacent platform or street for the purpose of safe boarding and discharge of passengers.

5.04—INTERIOR LIGHTING. Every LRV operating during hours of darkness shall be equipped with lights in the passenger compartment, arranged so as to illuminate the whole interior of the vehicle and in such a manner that windshield reflection will be minimized so as not to interfere with train operation.

5.05—EMERGENCY LIGHTING. LRV headlights, taillights, stoplights, interior lights, emergency flashers, and doorway lights sufficient to support safe exiting shall remain functional under emergency power conditions for a minimum of one (1) hour.

* * *

6. CONSTRUCTION REQUIREMENTS FOR LIGHT-RAIL VEHICLES

6.01—ANTI-CLIMBERS. Every LRV shall have installed on each end of the vehicle an anti-climber designed and constructed with projecting steel corrugations that will interlock with a similar device on another LRV in the event of a collision.

6.02—COLLISION OR CORNER POSTS. Every LRV shall be equipped with collision or cab-end corner posts. The connections of the posts to the supporting structures and the supporting structure itself shall be able to develop the full bending capacity of the collision or corner posts.

6.03—STRENGTH OF MAJOR STRUCTURAL COMPONENTS. Every LRV shall be designed and constructed so that all major structural components meet or exceed the following standard:

> Under the action of an end compression load equal to twice the weight of the unloaded LRV applied longitudinally at the end sills, there shall be no permanent strain in any structural member and there shall be no stress in any such member exceeding the yield strength or yield point of the material.

This standard shall apply for both the conditions of a fully loaded LRV and an unloaded LRV.

6.04—WINDSHIELDS AND WINDOWS. Windshields and windows shall be equipped and constructed as follows:

a. Every LRV shall be equipped with laminated safety glass windshields. Partitions and windows, other than windshields, shall be equipped with laminated safety glass, shatter-proof, or tempered glazing materials. Windshields or cab side windows shall have functional sun visors, if appropriate to the needs of the operator in relation to the design of the LRV.

b. All windows, except those entirely within the operator's cab, shall be designed and constructed so as to deter a person's head or arm from being readily extended to the outside from an open window.

6.05—EMERGENCY EXITS. Every LRV shall have all doors, except those designated exclusively for wheelchair or handicapped use, equipped so that in case of emergency, they can be easily opened by a passenger by a readily apparent or disclosed means.

* * *

7. OPERATING SPEED AND TRAIN PROTECTION REQUIREMENTS

7.01—BASIC SPEED RULE. The other provisions of this part notwithstanding, the operator of an LRV shall at all times operate at a safe speed that is consistent with weather, visibility, track conditions, traffic, traffic signal indications, and the indications of ATP systems where used.

7.02—SPEED PROFILE. LRVs shall be operated at all times within the maximum speed profiles established for the system. Speed limit signs which are visible from the operator's cab shall be posted in advance of critical locations.

7.03—MAXIMUM SPEEDS. The maximum speeds permitted on an LRT shall be established in accordance with the requirements presented in Table 1. (See page 27.)

7.04—CONDITIONS RESTRICTING MAXIMUM SPEED. Maximum speed shall be restricted over track with opposing traffic when LRV movements are not governed by block signals, cab signals, timetable, train order, current of traffic, or manual block system. In the absence of such control systems LRVs shall operate with caution at a speed prepared to stop within one half the distance of the operator's range of vision but not exceeding twenty-five (25) miles per hour.

7.05—SPEED PERMITTED ON PEDESTRIAN MALLS. Maximum LRV speed permitted on a promenade, pedestrian walk, concourse, mall, or plaza, which is closed to motor vehicles but where pedestrian movement across the tracks is authorized, is twenty (20) miles per hour unless otherwise restricted (see Table 1 on page 27).

7.06—TRAIN SIGNAL SYSTEM STANDARDS. The Signal Manual of Recommended Practices published by the Communication and Signal Division of the Association of American Railroads shall be used as a guide for the design and construction of LRT signal systems. When alternative standards are followed, they shall be specifically noted on the signal plans and specifications submitted to the Commission in accordance with Section 16.03 of this General Order.

7.07—CROSSINGS OF RAILROAD AND LRT AT GRADE. As required by Division 1, Chapter 6 of the State of California Public Utilities Code, the permission of the Commission shall be obtained before any LRT tracks are constructed at grade across any railroad or LRT tracks. LRT movements over alignments 9.04(a) and 9.04(b) (1) at grade across railroad or LRT tracks shall be governed by an interlocking installation. All signal indications and train movements within the interlocking limits shall be recorded by automatic recording apparatus. The provisions of General Order 33-B shall not apply to tracks used exclusively for LRT operations.

7.08—CROSSINGS OF STREETS AND HIGHWAYS AT GRADE. LRT systems which cross streets, roads, and highways at grade shall install and maintain automatic gate crossing signals to control motor vehicle traffic and automatic warning signals to control pedestrian traffic. When LRV operation is upon a street or highway permitting motor vehicle traffic, all intersections shall be controlled by traffic control devices.

The following general orders shall govern the protection and operation of grade crossings.

General Order Nos.	Subject
75-C	Protection of At Grade Crossings
135	Rules for Train Occupancy of At Grade Crossings
145	Rules from Exempting Certain At Grade Crossings from Motor Vehicle Stop Requirements

7.09—AUDIBLE WARNING. The LRV operator shall sound an audible warning:

a. when approaching at grade crossings protected by automatic crossing signals conforming to the requirements of General Order 75-C to control vehicle and pedestrian traffic,
b. at other locations specifically identified in the LRT system's operating rules, and
c. whenever the operator believes it is necessary and in accordance with the LRT system's operating rules and regulations.

* * *

8. SPECIAL PROVISIONS FOR HISTORICAL STREETCARS

8.01—DEFINITION OF "HISTORICAL STREETCAR". An LRV or streetcar originally manufactured prior to January 1, 1956, which may not meet all the requirements set forth in this General Order for LRVs.

8.02—APPLICATION OF PREVIOUS AND SUBSEQUENT PARTS. In addition to the special provisions set forth in this Part, the following requirements specified in these rules and regulations shall apply:

a. All of the following Parts:
   1. General Provisions
   2. Definitions
   7. Operating Speed and Train Protection Requirements
   9. Right-of-Way Standards
   10. Traction Power Requirements
   11. Fire Protection Requirements
   12. Requirements of Safety Sensitive Employees
   13. Operating Rules
   14. Inspections, Tests, and Maintenance
   15. Accident Reporting Requirements
   16. Miscellaneous Reporting Requirements

b. The following Sub-parts of Parts 3, 4, 5, and 6:
   3.04 Audible Warning Devices
   3.05 Grab Handles
   3.06 Safety Bars
   3.08 Warning Devices for Stopped Light-rail Vehicles
   4.07 Brake Failure Procedure
   4.08 Parking Brakes
   5.04 Interior Lighting
   6.05 Emergency Exits

8.03—SERVICE BRAKING SYSTEM. Every historical streetcar shall be equipped with a service braking system adequate to control the movement of and to stop and hold stationary such vehicle in a safe manner under all conditions of loading on any grade on which it is operated.

8.04—STOPPING DISTANCE. Every historical streetcar shall meet the following maximum stopping distance from an initial speed of 20 miles per hour under all conditions of loading on level, dry, tangent track:

Maximum Stopping Distance
from the Point of First
Operation of the Brake Actuator ..... 120 feet

8.05—HEADLIGHTS. If operating during the hours of darkness, every historical streetcar shall be equipped with a headlight that is capable of revealing a person or motor vehicle at a distance of 350 feet in clear weather.

8.06—TAILLIGHTS. If operated during the hours of darkness, the historical streetcar must be equipped with a taillight which is visible to the rear from 500 feet in clear weather.

8.07—WINDSHIELDS AND WINDOWS. Every historical streetcar shall be equipped with laminated safety-glass windshields. Windows and other areas fitted with glass shall employ safety-glass, tempered glass, or equivalent glazing material. Clerestory glazing is exempted from this requirement.

8.08—SAFE OPERATING SPEEDS. Safe operating speeds for historical streetcars shall be established and enforced consistent with the individual operating and braking characteristics of each class or type of streetcar, the condition of the track over which the streetcars will operate, and the nature of the motor vehicle traffic on streets and roads where streetcar operations will be conducted.

8.09—OPERATING RULES. Prior to historical streetcar operation, rules of operating procedure for such streetcars shall be prepared. The rules shall contain a listing of the maximum authorized speeds for each section of right-of-way where historical streetcars will be operated. The rules and operating speeds shall be filed with the Commission for approval pursuant to the provisions of Part 13 of this general order.

* * *

9. RIGHT-OF-WAY STANDARDS

9.01—TRACK REQUIREMENTS. The American Railway Engineering Association Manual for Railway Engineering shall be used as a guideline for the design and construction of LRT track-work. When alternative track-work design and construction standards are used they shall be specifically noted on the track-work plans and specifications submitted to the Commission in accordance with Section 16.03 of this General Order.

9.02—STANDARDS FOR THE INSTALLATION OF BARRIERS. When the separate right-of-way of a LRT system occupies the median of a divided arterial highway with fully controlled grade-separated access or is contiguous to such a highway, Caltrans' standard barriers of the following types shall be installed under the conditions indicated:

Distance from Center Line of Track to Edge of Nearest Travel Lane on Roadway	Type of Barrier
36 feet or less	Rigid concrete barrier at least 32 inches in height above the roadway.
Greater than 36 feet up to 45 feet	Rigid concrete barrier as specified above or semi-flexible metal barrier (thrie, W, box or other comparable beam) at least 33 inches in height above the roadway.

9.03—INSTALLATION OF CURBS, FENCES, AND BARRIERS. Concrete curbs, fences, or barriers, shall be installed along sections of separate right-of-way of an LRT system when there is a likelihood that motor vehicles or pedestrians may leave the travelled way of any nearby street or highway and encroach onto mainline track.

9.04—ALIGNMENT CLASSIFICATION.

a. Exclusive:
A right-of-way without at-grade crossings, which is grade-separated or protected by a fence or substantial barrier, as appropriate to the location. (Includes subways and aerial structures.)

b. Semi-Exclusive:
(1) Fully exclusive right-of-way with at-grade crossings, protected between crossings by a fence or substantial barrier, if appropriate to the location.
(2) Within street right-of-way, but protected by six-inch high curbs and safety fences between crossings. The safety fences should be located outside the tracks.
(3) Within street right-of-way, but protected by six-inch high curbs between crossings. A safety fence may be located between tracks.
(4) Within street right-of-way, but protected by mountable curbs, striping, or lane designation.

c. Non-Exclusive:
(1) Mixed traffic operation—surface streets.
(2) LRT/Pedestrian Mall.

9.05—EMERGENCY WALKWAYS. An unobstructed emergency walkway at least thirty (30) inches wide and accessible to persons getting off disabled trains shall be provided along all trackage in subways, tunnels, on bridges, and on alignment Classifications 9.04a, 9.04b(1), and 9.04b(2). Walkways shall have a reasonably regular surface and shall not have a slope exceeding one (1) foot vertical to six (6) feet horizontal. A single walkway may serve more than one track.

9.06—CLEARANCES.

a. The provisions of General Order 26-D, Sections 9, 10, and 11, shall not apply to tracks used exclusively for rail passenger operations defined in Sub-part 2.08 hereof as Light-rail Transit.

b. All clearances shall be measured from the dynamic envelope of the outermost surface of the largest vehicle on tangent track. The spacing of tracks and structures shall be increased proportionately for curved track to provide the minimum clearances specified in this part at all locations. Minimum clearances shall be such that no contact can take place due to any condition of design wear, loading or anticipated failure such as air spring deflation or normal lateral vehicle motion.

9.06—CLEARANCES (Cont.)

c. The minimum side clearance to obstructions higher than eight (8) inches above top-of-rail and the clearances between LRVs and streetcars located on parallel tracks used exclusively for light rail transit operations shall be governed by the following requirements:

(1) on station platforms, in yards and along shop aisles, and other locations, including emergency walkways, where passengers, employees, or other persons are permitted or required to be while trains are in motion, the minimum clearances shall be thirty (30) inches;

(2) at locations and in areas where passengers, employees, and other persons are normally prohibited while trains are in motion, the minimum clearance shall be eighteen (18) inches. Fixed wayside structures less than five (5) feet in length (e.g. catenary and signal poles, switching equipment) shall be excluded from this requirement provided approved measures are taken to give warning of restricted clearances;

(3) in exclusive right-of-ways including subways, tunnels, and portions of surface and elevated alignment which are equally inaccessible to persons, clearances may be reduced to the dynamic envelope of the largest rail vehicle operated, provided all LRVs and streetcars have windows effectively designed and constructed as provided in Sub-part 6.04b of these rules and regulations.

9.07—HIGH LEVEL PLATFORMS. Where passenger platforms are constructed to the nominal level of the floor of the LRVs operated, the space between the platform edge and the vehicle doorsill shall not be greater than three (3) inches on tangent alignment. A minimum personnel-refuge area measuring thirty (30) inches high and thirty (30) inches deep shall be provided under all high-level platforms. Special purpose platforms (e.g. handicap and crew loading platforms) shall be excluded from this requirement.

9.08—CROSSINGS OF PUBLIC STREETS AND RAILROADS. No crossings or intersections of tracks of an LRT system and a public road, highway, street, or track of a railroad corporation either at-grade or at separated grade shall be constructed without having first filed an application pursuant to the Public Utilities Commission Rules of Practice and Procedure, California Administrative Code, Title 20, and secured the permission of the Commission.

9.09—CONSTRUCTION, MAINTENANCE, AND ALTERATION OF GRADE CROSSINGS. The construction, maintenance, and alteration of crossings at grade of LRT trackage and public streets, roads, and highways shall be governed by the provisions of General Order 72-B and General Order 88-A.

9.10—RIGHT-OF-WAY SIGNS. Except along public streets and roads, every LRT system shall install and maintain clearly visible and legible advance signs warning operators of the following conditions:

a. Speed limits
b. Mandatory stops, except stations
c. End of signalized track

Other signs of an advisory nature, such as station ahead, grade crossing ahead, and resume speed, may be installed. All signs shall be placed above or adjacent to and preferably on the right-hand side of the track so that they will be clearly associated with the track to which they apply.

9.11—DERAIL WARNING SIGNS. Every LRT system shall install and maintain a clearly visible warning sign at the location of each derail. The sign shall bear the word "DERAIL" in black letters not less than seven (7) inches high on a white background.

9.12—CLEARING VEGETATION. All LRT system operating right-of-way shall be cleared of all vegetation that would:

a. Constitute a fire hazard.
b. Obstruct a vehicle or train operator's visibility of signs, signals, or the track ahead.
c. Interfere with employees in performing normal trackside duties.
d. Obstruct emergency walkways.

* * *

10. TRACTION POWER REQUIREMENTS

10.01—DEFINITIONS USED IN THIS PART. The following definitions shall apply to words and phrases used in setting forth these traction-power safety requirements:

a. High Voltage.
A nominal voltage of 600 volts or more.

b. Qualified Person.
An authorized person who, by reason of instruction, training, and experience, is familiar with high voltage circuits and equipment and has demonstrated familiarity with the work to be performed and the hazards involved.

10.02—ELECTRIC SUPPLY AND COMMUNICATION SYSTEMS. Electric supply and communication systems shall comply with the requirements of General Order 95, Rules for Overhead Electric Line Construction, and General Order 128, Rules for the Construction of Underground Electric Supply and Communication Systems.

10.03—ELECTRICAL SAFETY. In addition to the requirements of this sub-part, all traction power facilities shall conform to the National Electrical Code. Notwithstanding the provisions of Section 2706(a)(2) of the following referenced standard, all traction power facilities and employee work procedures shall conform to Title 8, Electrical Safety Orders, California Administrative Code.

10.04—TRACTION POWER INSTALLATIONS. Every LRT system shall ensure that all traction power installations and extensions, repairs, and changes in existing installations shall only be made by, or under the supervision or direction of, qualified persons. All substation buildings and enclosures shall be kept securely locked at all times. Access to such buildings and enclosures shall be limited to qualified persons only.

10.05—IDENTIFICATION. All switches, circuit breakers, and other control devices associated with the traction power system of every LRT system shall be located or marked to clearly indicate the apparatus, equipment, or area served by them. Permanent and conspicuous "HIGH VOLTAGE" warning signs shall be posted on all doors, gates, and covers of enclosures that provide access to conductors, equipment, and apparatus that are energized to high voltages.

10.06—ENERGIZED PARTS. Energized conductors, switches, and other apparatus, other than rails or rail-connected equipment installed or maintained by a LRT system shall be located or enclosed so as to prevent accidental contact by persons or objects. Rails and rail-connected equipment must be built and installed in a way that will prevent harmful voltages from affecting people that may come in contact with them.

10.07—DISCONNECT SWITCHES. Every LRT system disconnect switch intended for isolating an indoor or outdoor traction power circuit form sources of power using switches that have no rated capability for making or interrupting currents, shall be locked or interlocked to prevent opening or closing under energized conditions.

10.08—SHOP INTERRUPTER SWITCHES. In shop and maintenance areas where work is performed on or near high-voltage energized parts of vehicles, there shall be a readily apparent emergency switch to interrupt all sources of energy and power to any track, section of track, vehicle, or train which is energized.

10.09—NONCURRENT-CARRYING PARTS. Except within a substation, all noncurrent-carrying metal or metal parts of all fixed equipment and associated fences, railings, housings, enclosures, and supporting structures, including lamp posts, catenary poles, metal conduits and raceways, cable sheaths, metal frames, cases and hangers of equipment and metal switch handles and operating rods shall be permanently and effectively grounded or, for ungrounded DC system equipment, grounding may be through protecting devices that will disconnect the DC system under unsafe conditions.

10.10—CONSTRUCTION PLANS. No LRT system shall install any traction power equipment or apparatus or make changes to an existing traction power system unless done according to plans and specifications prepared under the responsible charge of a qualified person. All engineering documents relating to the traction power system shall show the name and title of the responsible qualified person.

* * *

11. FIRE PROTECTION REQUIREMENTS

11.01—FIRE PROTECTION REQUIREMENTS. All LRT systems shall establish fire protection requirements to control potential fire hazards. The minimum requirements for underground segments of the LRT system shall be as specified in the Standards for Fixed Guideway Transit Systems published by the National Fire Protection Association (NFPA 130). The minimum requirements for all other segments shall be established by the LRT system based upon a documented engineering analysis of the factors affecting fire hazards and fire risks using NFPA 130 as a guide.

* * *

12. REQUIREMENTS OF SAFETY SENSITIVE EMPLOYEES

12.01—DEFINITIONS USED IN THIS PART. The following definitions apply to words and phrases used in this part:

a. Safety Sensitive Employee.

An individual employed by an LRT system who operates LRVs or streetcars, or who dispatches or controls the movements of such LRVs, or who is engaged in the installation or maintenance of LRVs, train control, train protection, or signaling systems.

b. On Duty.

An employee is on duty from the time the employee begins to work or is required to be in readiness to work until the time the employee is relieved from work and all responsibility for performing work. Initial on duty status begins at a point following eight consecutive hours off duty.

12.02—DRIVER'S LICENSE. Every operator of a light rail vehicle or streetcar shall possess a valid class B commercial driver's license with a passenger transportation endorsement, except employees of those systems that do not operate combined bus/rail modes. At systems operating rail only, operators shall be required to possess a valid California class C driver's license, provided that a physical examination for persons meeting the class B licensing requirements established by the DMV is administered to such employees bi-annually.

12.03—USE OF ALCOHOL, NARCOTICS, OR DRUGS FORBIDDEN. The use, possession, or sale of alcoholic beverages, intoxicants, drugs, narcotics, marijuana, or controlled substances by safety sensitive employees of LRT systems, when on duty, is prohibited. Safety sensitive employees shall not be allowed to go on duty if such employees are under the influence of or have in their possession any drug, alcoholic beverage, intoxicant, narcotic, marijuana, medication, or other controlled substance, including those prescribed by a doctor, that will adversely affect their alertness, coordination, reaction, response, or safety. Excepted from this sub-part are employees under medication prescribed by a doctor who, with their employer's permission, are engaged in duties other than those that involve safety of operations or maintenance.

12.04—HOURS OF SERVICE—SAFETY SENSITIVE EMPLOYEES. LRT systems shall not require or permit any safety sensitive employee to remain on duty for more than twelve (12) consecutive hours or more than an aggregate of twelve (12) hours spread over a period of sixteen (16) hours.

* * *

13. OPERATING RULES

13.01—OPERATING RULES SHALL BE ADOPTED. Each LRT system shall adopt and enforce a set of operating rules which, as a minimum, are in full compliance with the safety rules and regulations of the Commission and other applicable federal, state, and local governmental agencies. Employees whose duties are governed by the operating rules shall be given a copy of the applicable rules. All work activities shall be performed in strict accordance with the operating rules.

13.02—OPERATING RULES SHALL BE SUBMITTED. No LRT system shall operate any light-rail vehicle over any of its trackage for regular service to the general public, for testing or readiness checking, or for any other purpose until its operating rules have been filed with the Commission staff.

Two copies of the carrier's operating rules shall be submitted a minimum of twenty (20) working days prior to their implementation.

The issuance of any bulletin, procedure, or order which revises or modifies the operating rules shall be filed concurrently with the Commission staff.

13.03—PROGRAM OF INSTRUCTION. Each LRT system shall adopt a program of instruction for all new employees. At least every two (2) years a refresher course on the meaning and application of the carrier's operating rules shall be provided. Records showing compliance with this requirement shall be maintained for four (4) prior calendar years.

13.04—PROGRAM OF OPERATIONAL EVALUATIONS. Each LRT system shall periodically conduct operational evaluations and inspections to determine the extent of compliance with the carrier's operating rules, Vehicle Code, timetables, special instructions, and other applicable property rules and procedures. Records of evaluations and inspections shall be maintained for two (2) calendar years.

13.05—PROCEDURES FOR TRANSPORTING PROPERTY. Each LRT system shall establish procedures to ensure that property carried on LRVs meets the requirements for transportation of property in Title 13, Section 1216 of the California Administrative Code.

* * *

14. INSPECTIONS, TESTS, AND MAINTENANCE

14.01—SYSTEM ACCESS BY COMMISSION REPRESENTATIVES. Representatives of the Commission shall be allowed to enter upon the property and onto any LRV or streetcar for the purpose of determining compliance with Commission rules, making tests, and inspecting records.

14.02—DUTY OF LIGHT-RAIL TRANSIT SYSTEMS. Every carrier, its representatives, LRV operators and other employees, shall afford representatives of the Commission all reasonable opportunity and facilities, to make such inspections and tests as provided for in this part.

14.03—OPERATOR RECORDS. Every LRT system shall maintain records of operator qualifications, training, testing, and other records showing compliance with this general order, the Vehicle Code, and other applicable regulations. Such records shall be maintained for the prior four (4) calendar years.

14.04—LIGHT-RAIL VEHICLE MAINTENANCE PRACTICES AND RECORDS. Every LRT system shall institute systematic inspection and maintenance practices for LRVs on a mileage, hourly or other periodic basis. LRT systems shall require that all LRVs, and all required accessories on LRVs, shall be inspected and maintained so that they are in safe working condition. An inspection and maintenance record shall be maintained for each LRV and kept on file for the four (4) prior calendar years.

14.05—TRACK MAINTENANCE PRACTICES AND RECORDS. Every LRT system shall establish a track maintenance and inspection program. The Federal Railroad Administration (FRA) track safety standards contained in Section 213.9 of sub-part A and all of sub-parts B, C, D, and E as published by the FRA in Title 49, Chapter II, Part 213 of the Code of Federal Regulations shall be used as a guideline to establish minimum safety standards and inspection intervals. When alternative safety standards and inspection intervals used are less stringent than those contained in Title 49, they shall be filed with the Commission. Records of periodic track inspections showing defects and deviations from the adopted standards along with the corrective action taken shall be kept on file for the four (4) prior calendar years.

14.06—TRACTION POWER SYSTEM INSPECTIONS AND RECORDS. Each LRT system shall adopt a traction power system (TPS) maintenance and inspection program. Records of TPS maintenance and inspection activity, including any defects or deviations from the adopted standards, shall be kept on file for four (4) prior calendar years.

* * *

15. ACCIDENT REPORTING REQUIREMENTS

15.01—REPORTING OF ACCIDENTS. Every LRT system shall submit accident reports to the Commission staff. Reportable accidents are those which exceed the thresholds established in this part and which are associated with the operation and maintenance of LRVs, streetcars, other on-track equipment, signal systems, traction power systems, or the maintenance of track and other wayside equipment. The provisions of General Order 22-B shall not apply to LRT systems.

15.02—INITIAL NOTIFICATION OF ACCIDENTS. Every LRT system shall immediately notify the Commission staff of the following classes of accidents by telephone:

a. Any fatality or serious injury (an injury requiring medical treatment as defined in the current Federal Railroad Administration Guide for Preparing Accident/Incident Reports) to patrons, employees, or other persons.
b. All fires or other hazardous events which require the evacuation of passengers or fire suppression activities conducted by the fire department.

15.03—WRITTEN REPORTS OF ACCIDENTS. Every LRT system shall submit written accident reports on forms prescribed by the Commission staff. Such written accident reports must be submitted within 30 days after the last day of the month in which the accident occurred. Written reports shall be filed for the following classes of accidents:

a. All accidents requiring immediate telephone notification.
b. All derailments or collisions between LRVs or between LRVs and other on-track equipment.
c. All accidents involving impact between LRT system on-track equipment and a motor vehicle, bicycle, or pedestrian at crossings of public highways, private roads, intersections, or on public streets between crossings or intersections.
d. Any other accident which results in monetary damage to LRT property which exceeds an amount to be established by the Commission staff.

* * *

16. MISCELLANEOUS REPORTING REQUIREMENTS

16.01—MONTHLY SUMMARY OF ACCIDENTS AND OPERATIONAL STATISTICS. Each LRT system shall file a monthly accident and operational statistical summary report. This report shall be filed on a form prescribed by the Commission staff within 30 days from the last day of the month covered.

The monthly summary report of accidents and operational statistics shall be filed whether or not reportable accidents occurred during that month.

16.02—SIGNAL FAILURE REPORTS. Every LRT system shall report each failure of a signal, signal appliance, crossing warning device, or other control system that results in a false proceed or other unsafe indiction that is hazardous to the movement of LRVs, streetcars, trains, or motor vehicles. The report shall be made within five business days after the failure occurred.

16.03—PLANS AND SPECIFICATIONS. As soon as an LRT system has developed plans and specifications for construction of a line, route, extension, or realignment of a line or route, copies shall be filed with the Commission.

If required, the filing shall include fire protection requirements which have been established by an engineering analysis of fire hazards and fire risks as provided for in Part 11 of these rules and regulations.

All final construction drawings, train protection and traction power plans, LRV drawings, track-work plans, and technical specifications shall be submitted to the Commission prior to the time the respective contracts are awarded or construction is started on any aspect of work covered by the plans and specifications.

All plans, drawings, and engineering documents shall be prepared under the responsible charge of a qualified engineer and each plan shall show the name and branch of engineering of the engineer responsible for it.

* * *

PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

By NEAL SHULMAN
Executive Director

Photoelectronic composition by
CALIFORNIA OFFICE OF STATE PRINTING

94 75178-765

TABLE 1. MAXIMUM PERMITTED SPEEDS FOR LIGHT-RAIL TRANSIT SYSTEMS

9.04 Alignment Classification	Crossing or Intersection Control	Train Protection	Maximum Permitted Speed	Notes
a. Exclusive	Not Applicable	ATP & ATS	No Limit	1
	Not Applicable	ABS Only	55 MPH	
	Not Applicable	None Required	45 MPH	2
b. Semi-Exclusive	(1) Between Crossings	Train Protection & Maximum Permitted Speed as for Alignment Classification 9.04, a, above		
(1) Fenced Right-of-Way with At-Grade Crossings	(2) At Crossings			
	Flashing Lights & Gates	ATP & ATS	No Limit	1
	Flashing Lights & Gates	ABS Only	55 MPH	
	Flashing Lights & Gates	None Required	45 MPH	2
	Traffic Signal or Other Approved Device	None Required	See Footnote 3	2, 3
(2) Street Median or Side Alignment with 6" Curb & Fence	(1) Between Crossings	None Required	Legal Speed of Parallel Traffic + 10 MPH	2, 5
	(2) At Crossings			
	Flashing Lights & Gates (Side Alignment Only)	None Required	Legal Speed of Parallel Traffic + 10 MPH	2, 5
	Traffic Signal or Other Approved Device	None Required	Legal Speed of Parallel Traffic But not to Exceed 35 MPH	2
(3) Street Median or Side Alignment with 6" Curb	Traffic Signal or Other Approved Device	None Required	Legal Speed of Parallel Traffic But not to Exceed 35 MPH	2
(4) Mountable Curb or Transit Lane	Traffic Signal or Other Approved Device	None Required	Legal Speed of Parallel Traffic But not to Exceed 35 MPH	2
c. Non-Exclusive (1) Mixed Traffic	Traffic Signal or Other Approved Device	None Required	Legal Speed of Parallel Traffic But not to Exceed 35 MPH	2
(2) Pedestrian Mall	Traffic Signal or Other Approved Device	None Required	20 MPH	4

Notes:
1) Speed is limited only by vehicle or alignment characterization.
2) Provided adequate stopping sight distance is available.
3) Traffic signal or other approved device at crossings on 9.04, b, (1) right-of-way may be authorized only in special locations, where speeds do not exceed 35 MPH.
4) Lower speed may be required for malls paved flush with the tracks.
5) Maximum speed 55 MPH unless ATP & ATS are provided. Maximum speed 45 MPH unless ATP is provided.